



WATER RESOURCES RESEARCH GRANT PROPOSAL

TITLE: Ground-Water Recharge Characterization Using Isotope And Geochemical Analyses, West Billings Area, Yellowstone County, Montana

FOCUS CATEGORIES: HYGEOL, WQL, WQN

KEYWORDS: Geochemistry, Ground-Water Hydrology, Ground-Water Management, Ground-Water Quality, Ground-Water Recharge, Irrigation, Land Use, Resource Planning, Urban Planning, Water- Quality Management

DURATION: May 1999 to April 2000

FEDERAL FUNDS REQUESTED: \$12,328

NON-FEDERAL (MATCHING) FUNDS: \$24,656

CO-PRINCIPAL INVESTIGATORS John Olson, Assistant Research Hydrogeologist, Jon Reiten, Associate Research Hydrogeologist Montana Tech of The University of Montana, Montana Bureau of Mines and Geology, Campus Box 112, 1500 North 30th, Billings, MT 59101

CONGRESSIONAL DISTRICT: Congressional District No 1 (Montana)

STATEMENT OF CRITICAL REGIONAL OR STATE WATER PROBLEM

In much of the area west of Billings, Montana (Figure 1), the shallow alluvial aquifer is the sole source of potable water. Recharge to this aquifer is highly dependent on the infiltration of high quality irrigation water that is applied over local croplands. However, rapid urbanization of this area has resulted in decreasing the acreage of croplands, and, consequently diminishing irrigation recharge. The loss of irrigation recharge is anticipated to have detrimental effects on both ground-water quantity and quality. To assure a future supply of good quality ground water, it is necessary to obtain a better understanding of the effects of urbanization on the shallow aquifer. Data provided by this study will be valuable to city and county planners, farmers, and homeowners in making informed decisions regarding land use and ground-water resource management.

STATEMENT OF NEED OR BENEFIT

The proposed study will provide data to better understand the sources and rates of aquifer recharge and their controls on ground-water quality. This information will make for better prediction of ground-water quantity and quality changes for alternate land-use scenarios, and will allow for informed regional land-use planning and ground-water resource management. Interest in the effects of urbanization on the ground water in the west Billings area has been expressed on several levels. A public workgroup sponsored

by the Yellowstone Conservation District (YCD) ranked water-resource problems from urbanization as the most significant problem in this area. The County Board of Planning has also identified maintenance of future water quality and quantity as a priority goal in their comprehensive plan for the Billings-Laurel area.

NATURE, SCOPE AND OBJECTIVES OF THE RESEARCH

The Montana Bureau of Mines and Geology (MBMG), a research department of Montana Tech, proposes to characterize sources and rates of ground-water recharge and sources and rates of ground-water geochemical evolution in the west Billings area. This will be accomplished by collecting ground-water and irrigation-water from select locations within the west Billings study area (as defined in Figure 1) for isotopic and common ion analyses. These data will be evaluated for temporal and geographic trends, isotope fractionalization, and radiometric dating.

This investigation will be conducted in conjunction with a larger on-going project by the YCD and MBMG to characterize the ground water in the west Billings area. Monitor well installation, geologic and hydrogeologic data, and additional sample data will be provided by the larger investigation.

The purposes of the proposed study are to evaluate the sensitivity of the alluvial aquifer to urbanization, and to provide data to allow for better land-use planning and ground-water resource management.